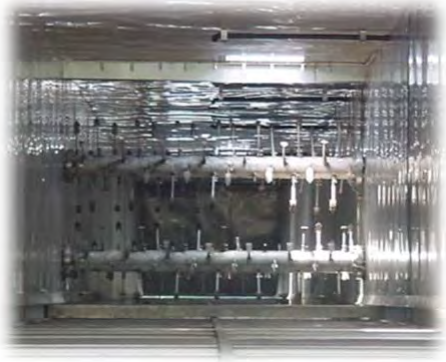
Next Generation
Bio-Solution Technology

Solutions for cleaner more sustainable communities

Bio-Solution

An efficient, sustainable solution to convert organic waste and biosolids into beneficial use materials

Whistler, B.C. Canada



- Tunnels designed to rapidly convert organic waste, then dried into various materials, such as compost for agricultural or landfill cover, or further dried into a biofuel for energy generation
- All organic waste is efficiently processed:
  - Biosolids & sludge from sewage
  - Food, wood, paper, cloths of natural fibers
  - Agricultural, Industrial, Marine, Medical
  - Tissue, sinew, bones, plant stocks
- Environmentally safe, non-odorous, carbon-neutral continuous processing without using any auxiliary fossil fuels
- 12-years continuous use in Whistler, BC as a high nutrient compost material for Squamish-Lillooet District (click on upper left image for video link) for agricultural use or landfill cover soil building
- If used as a biofuel, it is as combustible as coal for use in power plants to generate reliable continuous electric power with no noxious fumes

Disney, Florida USA

All by-products are useful commodities with zero harmful or non-usable residues
Clean water, compost, steam, electric power, potash-like fertilizer, CO_2

Bio-Solution

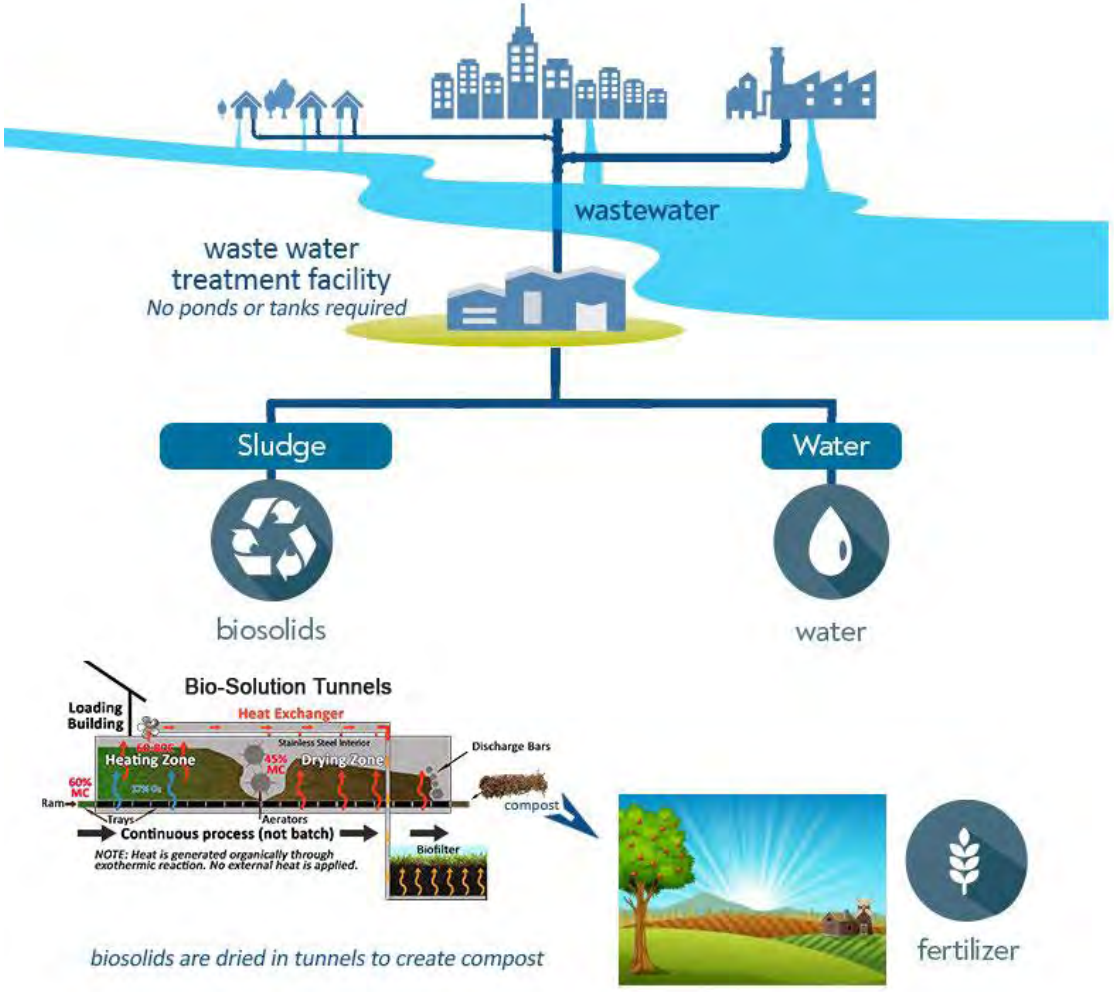
A revolutionary proven technology addressing all organic waste and biosolids issues

The Issues

- Biosolids, sewage, sludge and green-bin waste from urban centers are hauled over long distances, dumped into landfill sites, becoming an ever-growing part of municipal budgets
- Landfill leaching and gases threatening our water, soil and air
- Sewage, sludge and animal waste dumped on fields in rural areas increasing phosphorus levels and potential for water table contamination, including E-coli, viruses and un-digested antibiotics
- Fishery cleaning and canning waste polluting our shorelines
- Burning or burial of agricultural waste increasing harmful gases
- Stockpiles of wood waste reaching dangerous levels as fire and pollution hazards
- Under-performing municipal investments in anaerobic digesters, resulting in extremely inefficient power generation and digestates spread on fields rendering them unfit for farming for up to five years
- Backlog of development awaiting costly new sewage plants or upgrades
- Costly, intermittent wind and solar power solutions rife with other long-term issues
- Undigested viruses leached into our water systems and agricultural soils

We can solve all of these issues and generate clean materials and/or energy

The Bio-Solution Nutrient-Rich Compost Option



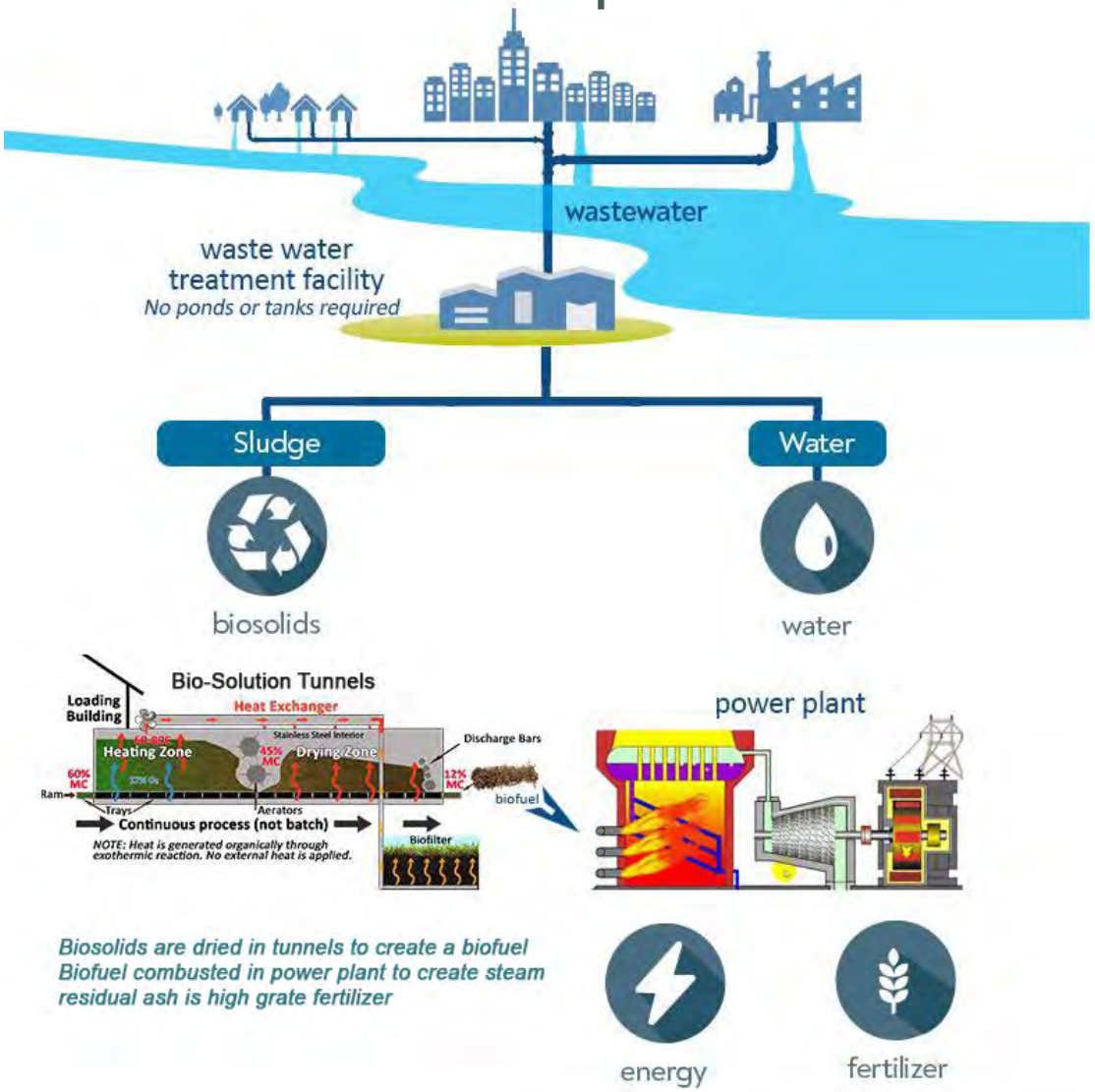
A State-of-the-Art ultra environmentally friendly municipal system with 100% diversion of biosolids waste would begin with a wastewater treatment facility to separate the water. No external ponds or tanks will be required.

Sludge is passed through a Belt Press to reduce moisture content.

Remaining biosolids are fed into the Bio-Solution tunnels where they are converted and dried to produce a nutrient-rich compost/fertilizer.

The output produced can be used on farms, sold at retail or applied as soil building land cover.

The Biofuel Option



A State-of-the-Art carbon neutral and net zero municipal system would begin with a wastewater treatment facility to separate the water. No external ponds or tanks will be required.

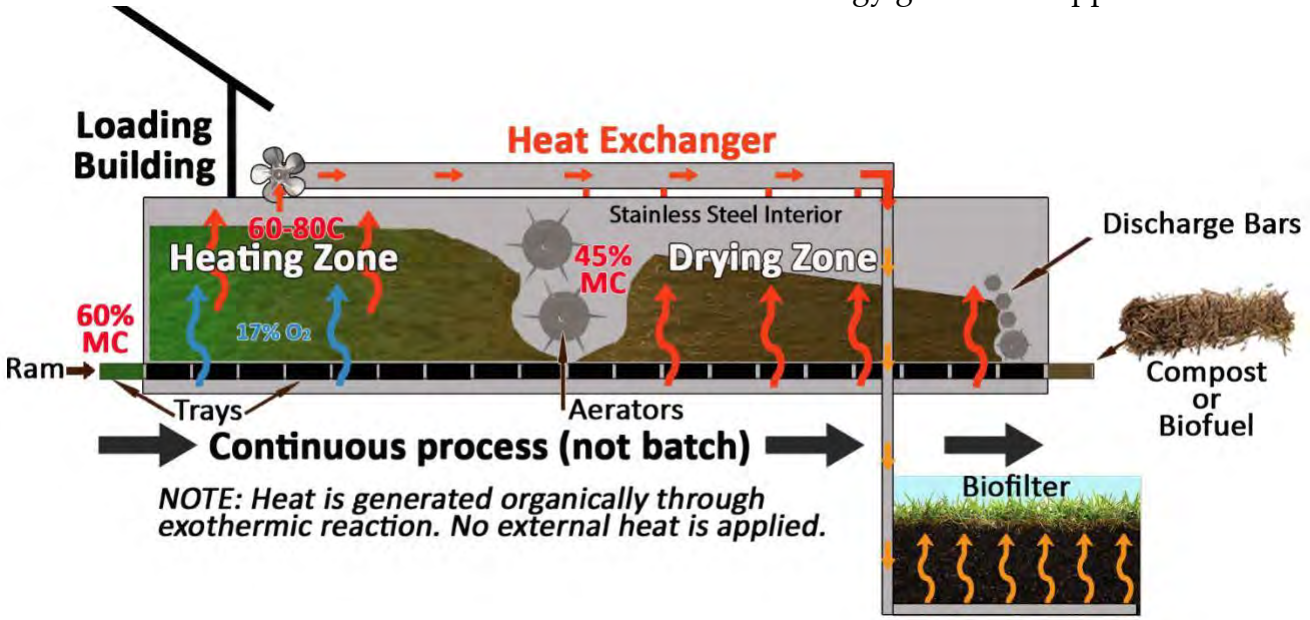
Sludge is passed through a Belt Press to reduce moisture content.

Remaining biosolids and organic waste are fed into the Bio-Solution tunnels where they are converted and dried to produce a Biofuel.

The Biofuel is then combusted in a specialized boiler to create steam, which is then utilized to drive turbines to create electrical power.

The Bio-Solution Process

100 tons of daily biosolids and organic waste produces 65 tons of compost and 35 tons of clean water over a 7-day period or 50 tons of Biofuel and 50 tons of clean water when dried for energy generation applications



- External fans draw in air to optimize the activity of inherent microbes
- Microbes breakdown organic cellular walls to release trapped water, which causes an exothermic reaction producing a large amount of heat
- The heat evaporates the water and is recaptured as a clean condensate
- A heat exchanger extracts and blows hot air to the Drying Zone of the tunnel
- Aerators (spinners) mix the material that is moved along on trays each day
- The material is dried to either produce compost or highly calorific Biofuel
- Exhaust air is fed through a biofilter to remove any odours

Practical Uses

Crossing the entire spectrum of human life and our industriousness

Residential & Commercial Development or Infrastructure Renewal

- Fast track development of residential and commercial properties with an environmentally friendly carbon neutral waste solution.
- Accelerate municipal sewage solutions. No odours or leaching. No residual waste or toxic fumes.
- Less expensive than traditional waste and sewage solutions. Scalable to any size of development.
- Compost material can be used as landfill cover or dried to create a Biofuel for power generation.

Industrial & Construction

- Disposal of wood, cardboard, paper and other organic fibrous materials
- As a Biofuel can be used in Co-firing for cement plants and power plants

Agricultural

- Disposal of plant stalks, animal fecal waste and rendering waste
- Environmentally safe compost for land application and/or fertilizer ash, CO_2 and clean water for irrigation as by-products of the Biofuel process

Airports, Cruise Ship Docks, Hospitals and Disposal of Virus Contaminations

- Each requiring on-site disposal of potentially hazardous organic waste
- Bio-Solution effectively handles all organic materials and natural fibres, including clothing & masks

Statistics

Organic waste tons per day	50	100	150	300
Biofuel produced per day	25	50	75	150
Net exportable power	0.7 MWh	1.5 MWh	2.4 MWh	5 MWh

Unleashing the economic power of waste

Capacities & Output

- A small tunnel can handle 50 tons of waste each day, while typical tunnel is designed for 100 tons
- Tunnels can be assembled in parallel without limit thus processing as much waste as necessary

Size & Scalability

- Standard tunnel is 2.5m high x 3m wide and 100m long
- A typical 3-tunnel solution will require a loading building of 30m x 30m and total land area of 0.4 hectare (1-acre) including the tunnels
- Bio-Solution can be situated in lesser urbanized area with lower land costs, although there is no odour issue if placed within urban zones

Operating & Maintenance

- Only 2 operators are required on a part-day basis
- The tunnels are stainless steel and expected to last 30+ years, only the aerator heads require replacement
- Typical boiler requires 3 days of service each month

Costs

- Cost will vary based on location, transportation, local manufacturing costs and size of solution
- In many cases government grants are available to offset costs

Comparisons

The Bio-Solution is the most complete & efficient treatment of waste

	Bio-Solution	Incineration	Anaerobic Digestion	Gasification
Waste Input (Feedstock)	**All organic waste** MSW residential, commercial, agricultural, industrial, invasive species	**All MSW waste** Including plastics, metals, etc	**All Organic Waste**	**Organic Waste** of max 25% moisture content
Wet Biosolids (Feedstock input)	**Yes** Receives wet biomass waste with no pre-drying required	**No** Requires additional auxiliary fuel to evaporate the moisture	**Yes**	**No** Requires pre-drying with auxiliary fuel
Auxiliary Fuel Required	**No**	**Yes** Pre-drying of wet waste	Extensive external energy to heat tanks of waste	Extensive external energy to heat tanks of waste
Net Energy Production	**Highest** Does not require any power generated by the system	**Lowest** Requires power generated to perform incineration	**Medium** Scavenges power for digestion process	**Low** Scavenges power for drying process
Power	**Consistent**	**Variable**	**Variable**	**Variable**
Human Health Concerns	**None**	**High** Release toxic metals, dioxins, acid gases, toxic ashes & residues	**Medium** Inert gas released. Resulting digestate difficult to dispose.	**None**
True Support 3-R's reduce, reuse, recycle	**Yes**	**No**	**Yes**	**Yes**
Environmental impact potential	**Lowest**	**High**	**Medium**	**Low**

More Comparisons

The Bio-Solution is the most economical Waste-to-Energy solution

	Bio-solution	Incineration	Anaerobic Digestion	Gasification
Siting of Facility	Can be in populated areas	Not in populated areas According to WHO	Can be in populated areas	Can be in populated areas
Truly Clean, Green Technology	**Yes** Only output is biofuel and clean water; no odours	**No** Polluting airborne nanoparticles and toxic ash	**No** Airborne pollutants and highly odorous digestate	**Yes** However very costly way to dispose of waste with low energy production
Usable as Compost	**Yes**	**No**	**Debatable** Lack of conversion resulting in no oxygen content thus fertilized land unusable for up to 3-5 years	**No**
Scalable & Modular	**Yes** Low as 50 tons per day to an unlimited daily amount. Most cost effective & real economies of scale.	**No** Cannot operate with low quantities of waste	**Yes** However remains costly due to lack of economies of scale.	**Yes** However remains very costly due to lack of economies of scale.
Capital Costs (per ton per kw)	**Lowest** Per ton fuel processed	**High**	**High**	**High**
O & M Yearly Costs	**Lowest**	**High**	**Medium**	**Medium**
Typical Return on Investment (yearly)	**4 to 8 years**	**12 to 25 years**	**12 to 25 years**	**Negligible return**